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REGULATING FLOOD-PRONE LAND IN MARYLAND

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MARYLAND DEPARTMENT OF STATE PLANNING

Flood Disaster Coordination Office

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Maryland Department of State Planning
301 West Preston Street
Baltimore, Maryland 21201

Publication No. 220

MAY, 1975

The State of Maryland
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May 1975

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Abstract

1. Title: Regulating Flood-Prone Land in Maryland

2. Authors: Staff, Flood Disaster Coordination Office

3. Subject: A review of floodplain and stormwater management programs in Baltimore City and the twenty-three counties of Maryland. Program information was gathered from personal interviews, related correspondence and research. Management practices center on zoning, subdivision regulations and building codes. The report ends with a discussion of judicial reaction to floodplain and stormwater management practices.

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DEPUTY SECRETARY

The Honorable Marvin Mandel
Governor of Maryland
State House
Annapolis, Maryland 21404

Dear Governor Mandel:

I am pleased to transmit a copy of Regulating Flood-Prone Land in Maryland. This report reviews the floodplain management programs of the Counties and Baltimore City and discusses the judicial response to various management practices.

This report was prepared by the Flood Disaster Coordination Office, established by you in September 1972 to coordinate Hurricane Agnes flood prevention and recovery planning in the State of Maryland.

Sincerely,

Vladimir Wahbe

Vladimir Wahbe

Acknowledgements

During the preparation of this report, many persons working for local government and the State, too numerous to mention, were contacted personally or by phone for information on existing regulations and administrative and policy concerns as well as requests for publications. Their cooperation and contributions are acknowledged and greatly appreciated.

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Introduction

In 1968, the Congress of the United States passed the National Flood Insurance Act which offered a voluntary flood insurance program to provide for limited protection to potential flood victims. One principal objective of the Act was to make flood insurance available to residents of flood-prone areas at reasonable rates through the means of a Federal subsidy. Another purpose of the Act was to require local jurisdictions to enact control measures to guide the rational use of the floodplain as a condition to their citizens receiving Federally subsidized flood insurance. Reports to Congress indicated that the flood damage hazard in the United States was continuing to rise as increasing numbers of people moved to coastal and river locations to live, for recreation and for business. Studies upon which these reports were based revealed that unwise development, reflecting ignorance, or indifference, and sometimes an overestimation of the flood protection contributed to the increased demand for property in flood-prone areas. These trends set into motion processes whereby flood damages were accelerated.

As a result of increasing flood damage despite large expenditures by the Federal Government, the 1968 Act was amended in 1973. Section 1302 of the amended Act states that "despite the installation of preventive and protective works and the adoption of other public programs designed to reduce losses caused by flood damage, these methods have not been sufficient to protect adequately against growing exposure to future flood losses." A review of the history of flooding in Maryland as set forth in Chapter 1 reveals that this national occurrence is characteristic of Maryland as well. For example, a recent storm in December 1974 caused $4 million worth of damage on the west side of the Bay from Baltimore County to Calvert County. Hurricane Agnes in 1972 caused over $43 million of public property damage and over $66 million of private property damage in the State of Maryland as well as over $134 million worth of damage to bay related industries. No money value can be placed on the 17 lives which were lost. Flooding in 1971 in Central Maryland was reported to be the "worst Baltimore area flood in more than 35 years" by the Sunpapers.

It is readily apparent that flood protection programs have moved at a slower pace than people have moved themselves and their property into flood-prone areas. The 1973 amendments increase the limits of flood insurance coverage, provide for the identification of flood-prone areas and require, as a condition for receiving insurance, that the local qualifying jurisdiction establish and maintain adequate regulation of flood-prone areas. Failure to participate in the program or maintain adequate regulation may result in denial of loans, grants, guarantees, mortgage insurance, and similar forms of assistance from Federally insured or regulated lending institutions.

In Maryland as nationally, the actual development and implementation of land use regulations in flood-prone areas have lagged

considerably behind the basic recognition of the need. Tools for implementating workable mitigation measures exist in the form of zoning, building and subdivision regulations and other forms of police powers delegated to local counties and Baltimore City by the State. This report will review the adequacy of these regulations, specifically zoning, building and subdivision regulations.

The State has taken steps to assume responsibilities with respect to flood control. Agencies have been created and assigned responsibilities for the purpose of protecting the interests of the people from the destructive impact of flooding. The duties and responsibilities of these departments with regard to floodplain management are discussed in some detail, although not comprehensively, in Chapter 4.

CHAPTER 1

A History of Flooding in Maryland

The first recorded major flood in Maryland occurred on May 11, 1860 along the Jones Falls in Baltimore City. Harper's Magazine recorded the incident stating that a portion of the City was inundated causing heavy damage in the business district and that many of the City's bridges crossing Jones Falls were destroyed.

Harper's reported a worse flooding of the Jones Falls on July 24, 1868 which covered most of what was the Baltimore City. "The Great Freshet", as Harper's called the flood-producing rainfall, caused heavy losses of life and property. The flood was a setback to Baltimore's commerce and industry which was booming after the Civil War. This same storm caused the Patapsco River to flood Ellicott City, destroying many homes and industries.

In 1889, the largest flood of record before 1936 occurred on the Susquehanna River. Neither the extent of damage nor precise date of the flood is known. The same storm system caused flooding on the Potomac with water reportedly reaching 45 feet above normal.

Extensive flooding was reported along the Herring Run flowing through Baltimore County and Baltimore City on August 4, 1911. On July 23, 1923, the Patapsco River flooded again causing more damage than the 1868 flood. Ellicott City was inundated. Farm buildings and mills along the River were destroyed. The Baltimore and Ohio Railroad had miles of track destroyed.

In 1924, the upper Potomac Watershed twice released flood flows. In March, the Potomac was 20 feet above normal devastating parts of Cumberland. In May, the River rose again, causing more damage in Cumberland. At the same time, Antietam Creek flooded the City of Hagerstown.

The spring thaws of March 4, 1934 caused flooding in Carroll and Howard Counties. Heavy rains on July 9, 1935 caused waters to flood Aberdeen, Havre de Grace and Elkton. The same storm washed out roads and bridges in Southern Maryland. In September of 1935, Federalsburg in Caroline County on the Eastern Shore experienced flood waters to a depth of nine feet above normal.

However, the worst flood was yet to come. In March 1936, melting snow and heavy rainfall throughout the State caused extensive flooding of the Potomac and Susquehanna Rivers. Cumberland's central business district was inundated leaving hundreds of workers marooned in upper floors. Flood waters reached a depth of 14 feet in some areas. Estimated losses were three million dollars. Only two merchants had flood insurance.

Towns along the banks of the Potomac River were devastated. Hancock was entirely inundated. In Williamsport, waters reached a depth of 49.6 feet above normal. This was four feet above the waters of the 1889 flood. The Point of Rocks area was destroyed with two-thirds of its population left homeless. Bridges crossing the Potomac north of the Monocacy River were swept away. By the time the waters reached the lower, wider portion of the Potomac, the crest had subsided, causing little damage to Washington, D.C. and Southern Maryland. Most of Port Deposit and Havre de Grace were flooded.

Property damage due to the 1936 flood exceeded five million dollars in the State. The Federal Government gave the State one million dollars for flood repairs. Only temporary relief was available to the thousands of Marylanders who were wiped out by the flood and had to start again.

The 1936 flood marked the first involvement by the Department of State Planning (then called the State Planning Commission) into flood related problems. At the request of Governor Nice, the Chairman of the State Planning Commission was requested to report on flood damage within the State. This flood also brought about the recognition that something was needed to avert future disasters. A Sunpapers article dated March 24, 1936, quoted the State Director of the National Emergency Council as saying three things were needed in Maryland: (1) relief in flood areas; (2) rehabilitation; and (3) flood control. No mention was made of flood insurance.

Little was done in the area of flood control in the following year. In January of 1937, the Potomac flooded Hancock. In April, a "northeaster" caused extensive flooding in the State. Damage to Cumberland, Williamsport, Baltimore, Dundalk and Washington, D.C. was nearly a million dollars. Considerable damage was reported in Chestertown, Salisbury and Southern Maryland. In October 1937, the Anacostia River overflowed and inundated Hyattsville, Bladensburg and other areas of Prince George's County. The same storm system passed over Baltimore causing the Gwynns Falls and Patuxent Rivers to flood with minor property damage reported. The next week, another storm caused the Potomac to flood and inundate Cumberland, Hancock and parts of Southern Maryland. Some towns in Western Maryland had been flooded three times within the past eighteen-month period.

In August of 1942, heavy rains were reported causing flooding in Dundalk, Parkton and Southern Maryland. In October, Cumberland and Hancock experienced more flooding. Flood waters reached a depth of 3½ feet in Cumberland's business district. Williamsport and Point of Rocks were also flooded. The Potomac River was reported to have reached heights of 32 to 34 feet above normal. Flood waters reached 17.6 feet above normal at Washington, D.C. In the Baltimore area, Ellicott City was inundated by two feet of water from the nearby Patapsco River.

During the next twelve years, the State did not experience severe flooding, although minor flooding was reported in newspaper accounts. On July 18, 1945, there was minor flooding throughout the State due to

a five-day rainfall. Cumberland received a flood threat in April 1948, but no flooding occurred. The Eastern Shore experienced flooding in 1948 with minor damage reported in Salisbury. In July 1949, minor floods in and around Hagerstown blocked roads. The same storm caused flooding in Frederick and Baltimore Counties.

On October 14, 1954, Hurricane Hazel dumped heavy rains on the State. Twelve hours of rain resulted in severe flooding on the North Branch of the Potomac River and caused flooding along the main branch from Cumberland to Washington, D.C. Damage on the North Branch was estimated at $649,000. The Savage River Dam, completed in 1951 by the Corps of Engineers, was credited with preventing an estimated five million dollars worth of damage. Other areas of Maryland suffered considerable damage.

The next record of severe flooding was August 26, 1958. Heavy rains on the Eastern Shore caused a dam on Marshy Hope Creek to break and inundate Federalsburg. The town was declared a disaster area.

Heavy rains and resulting flooding occurred in St. Mary's County in July 1960 due to Hurricane Brenda. In August 1960, the Potomac and its tributary, Wills Creek, flooded parts of Cumberland.

On March 6-7, 1962, a "northeaster" hit the Eastern Shore of Maryland and was called the most destructive extra-tropical cyclone ever experienced from Florida to New England. In the six states effected by the storm, total property loss neared two hundred million dollars with Maryland's share of damages estimated at seven million five hundred thousand dollars to shore property. Two-thirds of Ocean City's population had to be evacuated; at least one death was reported.

Ten-year frequency floods occurred throughout Maryland in September 1966. The following year saw increased flooding. In August 1967, Federalsburg and Greensboro in Caroline County were declared disaster areas. Heavy rains were also reported as occurring throughout the month of August. In April 1970, minor flash floods hit the Cumberland area and in July, the Monocacy flooded low lands after a heavy rainstorm.

August and September 1971, brought moderate flooding throughout Central Maryland. Laurel, Westminster, Ellicott City and Baltimore experienced damage. In September, heavy rains and wet weather caused flooding in many parts of Central Maryland. Howard County was the hardest hit, with damage estimated at $1.1 million.

The worst flood in the State in 36 years occurred the following June. Between June 21 and 24, 1972, Hurricane Agnes dumped heavy rains on the State which resulted in over 43 million dollars of damage to public property, 66 million dollars of damage to private property and 134 million dollars worth of damage to Chesapeake Bay related industries. No money value can be placed on the 17 lives which were lost.

Agnes was estimated to be a storm with a frequency of occurrence of once every one hundred years. Almost every water course in the State overflowed its banks. The Patapsco flooded Ellicott City and caused widespread damage. Columbia and other parts of Howard County were flooded due to swollen streams and rivers. The Susquehanna inundated Port Deposit and parts of Havre de Grace. For a while, it was feared that the Conowingo Dam on the Susquehanna River would break. The Potomac, again, flooded the towns along its banks, including Cumberland, Point of Rocks and Williamsport. Gwynns Falls, Jones Falls and Herring Run in Baltimore City and County flooded and caused loss of life and extensive property damage. The list of flooding and damage caused by Agnes goes on almost indefinitely. It may seem preposterous to many, but if the occupation of flood-prone areas had been properly restricted, most of the damage resulting from Hurricane Agnes and other less severe storms could have been avoided.

Flash floods were caused by heavy rains in some areas of the State in July 1972, but their damage was minor to areas already hit by Agnes a month earlier. In December 1974, a storm caused $4 million of damage to the coastal bay areas of Baltimore, Anne Arundel and Calvert Counties.

CHAPTER 2

Local Programs Regulating Flood-Prone Areas

The basis of floodplain management is the growing realization among responsible planners and officials that uncontrolled land use in the floodplain entails unacceptable risks to human lives and property. In intensive watershed areas, flooding itself is a recurring and inevitable phenomenon. The use of manmade structures to halt or resist flood flow often have aggravated flood damage rather than alleviated it. Perhaps the greatest danger, then, lies in man's refusal to recognize the magnitude of the threat posed by flooding.

Generally, governmental response to flooding has taken three forms: building artificial barriers such as dams, levees and bulkheads to retain or redirect floodwaters; financial aid for rehabilitating areas damaged by flooding through subsidized flood insurance, loans, or direct grants; and land use regulations which restrict damage-prone development within areas susceptible to flooding. The Flood Insurance Act of 1973 is based upon the finding that flood insurance can best promote the public interest through a joint program of providing appropriate protection in the form of insurance against the perils of flooding and encouraging sound land use which minimizes exposure of property to flooding. A primary purpose of the Act is to encourage local government as well as the State to make appropriate land use adjustments to restrict the development of flood-prone land and guide development away from hazardous locations threatened by floods.

This chapter summarizes the local programs of the twenty-four local jurisdictions in Maryland with regard to the third approach: land use regulation. Regulation includes police power measures which control land use and development for the purpose of minimizing or eliminating flood damage. Three types of regulations generally employed are zoning regulations, subdivision regulations, and building codes. Other regulations such as the use of conservation districts, sediment and drainage regulations and other environmental controls which have some application to floodplain management will also be discussed.

Zoning is the legal tool that is used to implement and enforce comprehensive plans which insure the safekeeping of property for the public health and welfare and best use of available land. Floodplain zoning involves the designation of a zone for the purpose of passing flood waters and for other limited uses that do not conflict with that primary purpose. The ordinance may also establish regulations for fringe areas which designate elevation below which certain types of development cannot be constructed.

A subdivision can be defined in a broad sense as a tract of land divided into lots for the purpose of sale or building construction. Subdivision regulations are used by local governments to specify the manner in which land is subdivided. They may state the required width of streets, size of lots, elevation of land, freedom from flooding, size of floodways, and other points pertinent to the welfare of the community. These regulations provide an efficient means of controlling construction in presently undeveloped floodplain areas.

Building codes set forth the standards for construction of buildings and other structures for the purpose of protecting the health, safety and welfare of the citizens of jurisdictions which adopt them. A well written and properly enforced building code can effectively reduce damage to buildings in the floodplain. Some of the requirements which should be included to reduce flood damages are: preventing the flotation of buildings from their foundation by proper anchorage; establishing basement elevations and minimum first-floor elevations above potential flood heights; and requiring a sufficient structural strength to withstand water pressure or high velocity of flowing water.

While these definitions provide a useful conceptual framework, in actual practice local regulatory measures do not fit neatly into these categories. In order to fully understand the analysis as presented, it must be remembered that some hybrid forms do exist. For example, zoning concepts are incorporated into subdivision regulations in Prince George's County and zoning regulations in Kent County include construction standards for building in flood-prone areas. In each jurisdiction, a local regulatory body, variously labelled as "planning commission", "planning and zoning board", or similar title, is vested by the county with supervisory authority over one or more of these funtions.

In analyzing the floodplain management program of the twenty-four Maryland jurisdictions, the follow research and review process was used:

1. Interviews with local planners and government officials to obtain information on existing regulations, and their administrative and policy concerns.

2. Documentation and review of existing regulations.

3. Analysis of data to consider adequacy and effect of regulation.

4. Review of proposed regulation and updating of data (November 1974).

Table 1 below summarizes existing floodplain regulatory programs in the State's twenty-four major subdivisions.

Table 1 - References to Local Regulations Which Incorporate Flood Protection Measures

Jurisdiction	Zoning Regulations	Subdivision Regulations	Building Code
Allegany County		Subdivision Regulations Sec. 4:03	
Anne Arundel County	County Code Sec. 13-319 Planning and Zoning	County Code Sec. 13-109 Planning and Zoning	
Baltimore City		Subdivision Ordinance Sec. 3.0-10	City Charter Sec. 32
Baltimore County	Tidal Areas Only County Regulations Sec. 417	County Code Sec.22-34(b)	BOCA Code County Supplement Sect. 320
Calvert County	County Code Art. 14	County Code Art. 5	County Code Art. 20 and SSBC (Southern Standard Building Code) as amended by County Resolution 40-73

Table 1 Con't
References to Local Regulations Which Incorporate Flood Protection Measures

Jurisdiction	Zoning Regulations	Subdivision Regulations	Building Code
Caroline County		Subdivision Regulation #5	
Carroll County	Zoning Code Division X Sec. 14.10	Subdivision Regulations Section IV, Preliminary Subdivision Plan Regulation #5; 11; and 12	BOCA Code Article 21
Cecil County	Zoning Regulation, Sec. No. 5, Subsection 11		
Charles County			BOCA Code Section 113 as amended by County Resolution No. 73-9
Dorchester County		Subdivision Ordinance Article 5 Section 501(c)	
Frederick County	County Code Secs. 40-1; 40-21.2	County Code Sec. 38A-30(3)	
Garrett County			
Harford County		Subdivision Ordinance Sec. IV, 4.02	
Howard County		Subdivision Regulations Sec. 115.1	BOCA Code Article 21 with 12-14-72 Amendment
Kent County	Zoning Resolution 1-2-73	Subdivision Regulations Art. 6, Sec. 2	

Table 1 Con't
References to Local Regulations Which Incorporate Flood Protection Measures

Jurisdiction	Zoning Regulations	Subdivision Regulations	Building Code
Montgomery County*	Sec. 111-57 as amended Sec. 59-194	Sec. 50-32	BOCA Code Article 21
Prince George's County*		Sec. 16, A	BOCA Code Article 21 Secs. 2101.3 2101.6
Queen Anne's County	Zoning Ordinance Art. 5.21	Ordinance No. 17, 6165, Subdivision Regulation, Section III-a (A)(3)	
St. Mary's County	Zoning Ordinance Sec. 4.15		
Somerset County	Zoning Regulations Sec. 2		
Talbot County	Zoning Ordinance Sec. 32.01	Subdivision Regulations Sec. 7	
Washington County	Zoning Regulations Sec. 22.4		
Wicomico County		Subdivision Regulations Sec. E	SSBC (Southern Standard Building Code)
Worcester County	Zoning Regulations Secs. 5.20; 15.30		

*Floodplain development is further regulated in Montgomery and Prince George's Counties by the Maryland-National Capital Park and Planning Commission with the approval of respective County Councils.

A. The Use of Zoning in Regulating the Floodplain

Table 2 below shows floodplain zoning broken down into four classes. Jurisdictions which have enacted a zoning ordinance incorporating a zone which includes lands subject to flooding and limiting the uses allowed in those areas, are indicated as Class A jurisdictions. Class B jurisdictions are those which have not incorporated a flood zone as a distinct district within their zoning ordinance but do restrict uses susceptible to flood damage within other type districts. For example, no building would be allowed in that part of a commercially zoned area which is flood-prone. These are defined as "non-delineated flood zones" which are incorporated into a zoning ordinance without actually delineating the area. The burden of locating flood-prone areas may be placed on the builder or the jurisdiction may identify these areas through their own engineering studies or from information from other county activities. The zoning office will review any new use within a zone to see if it is within a flood-prone area and may require a relocation, structural change, increase in building elevation or other measure before the new use is approved. If the location of the new use will seriously conflict with the floodplain character of any part of a zone or district, it will not be allowed.

Jurisdictions which apply minimal or discretionary standards through a conventional zoning ordinance are designated as Class C jurisdictions. The application of a discretionary standard is determined by administrative decision. An example is the use of discretionary criteria where a use in a flood-prone area is conditioned upon the zoning administrator determining that the land is "reasonably safe" from flooding. Class D jurisdictions are those whose zoning regulations make no mention of flood-prone areas.

Table 2 - Classification of Local Zoning Ordinances As to Ability to Regulate Flood-Prone Land

Jurisdiction	Class A	Class B	Class C	Class D
Allegany County				X
Anne Arundel County	X Open space district includes land within 100-year floodplain			
Baltimore City				X
Baltimore County			X Restrictions in tidal areas only	

Table 2 Con't
Classification of Local Zoning Ordinances As To
Ability to Regulate Flood-Prone Land

Jurisdiction	Class A	Class B	Class C	Class D
Calvert County	X Floodplain not defined. Location determined by zoning inspector.			
Caroline County				X
Carroll County			X	
Cecil County	X Incomplete coverage			
Charles County				X
Dorchester County				X
Frederick County		X		
Garrett County				X
Harford County				X
Howard County				X
Kent County			X	
Montgomery County		X		
Prince George's County		X		
Queen Anne's County		X		
St. Mary's County		X		
Somerset County			X Controls wetland areas	
Talbot County		X		
Washington County		X		
Wicomico County				X
Worcester County		X		

As indicated in Table 2, Anne Arundel, Calvert and Cecil Counties restrict land use within an expressly delineated flood zone. Residential development within that zone is prohibited in these jurisdictions and the land reserved for agricultural or recreational purposes or preserved as open space. The Anne Arundel County Zoning Code, for example, provides that lands within the 100-year floodplain shall be designated as "open space districts" with limited and specific permitted uses: conservation uses, existing residences, grazing, beaches, rights-of-way etc. Special exception is made only for utilities and public uses. The zoning regulations also require firm anchoring to prevent flotation and prohibit structures from obstructing the free flow of water.

Calvert County's Zoning Ordinance provides for a similar district (designated "F-1", Floodplain District) with like restrictions, but allows a property owner, "upon altering the natural terrain to remove said land from floodplain district", to use the land as permitted in the adjacent district, subject to the other zoning regulations. This seemingly broad exemption appears offset by the restrictions on filling imposed by the county's Sediment Control Ordinance. While permanent structures relating to agricultural uses are prohibited, no similar expressed prohibition as to recreational uses appears in the language of the ordinance; however, the regulation may fairly be said to forbid almost all construction in the floodplain. The floodplain is not delineated but it must include at least fifty feet from the center of the body of water to the boundary of the floodplain. Within the floodplain district section, no exemption is accorded to pre-existing uses.

The Cecil County ordinance recites an intention to prohibit uses which "unduly increase flood heights," in addition to forbidding uses directly subjecting property and lives to flood hazards. Farms, parks, and conservation areas are permitted by right in the floodway zone. The Board of Zoning Appeals is empowered to allow only "other uses employing open land" subject to express qualification including non-obstruction of the flow of flood waters. Only a small portion of the County's flood-prone areas is within this zone.

Eight jurisdictions* have established non-delineated floodplain zones, which are based on technical data and superimposed on an existing conventional zoning plan. Frederick County, for example, has designated an "annual floodplain" based on soils maps prepared by the Soil Conservation Service as well as an "historical floodplain" based on the Corps of Engineers delineations of flood-prone areas. Construction is prohibited in these zones except that single-family dwellings and accessory structures are permitted on lots recorded prior to the adoption of the floodplain ordinance. Montgomery County's zoning laws prohibit generally the building of structures within the 50-year floodplain. For example, in the two acre, clustered residential estate zone, all land indicated as the right-of-way of a highway and the 50-year floodplain areas which

*Frederick, Montgomery, Prince George's, Queen Anne's, St. Mary's, Talbot, Washington and Worcester Counties.

in the opinion of the Planning Board would constitute an excessively high percentage of the total tract, is deducted from the gross area of the tract.

The Queen Anne's County Comprehensive Zone Ordinance restricts building in any area subject to periodic flooding by any stream, lake or other body of water. The Zoning Ordinance also states that no building used for dwelling purposes shall be located within fifty feet of any such water or any marsh or swamp, nor shall the lowest habitable floor level be less than seven feet above the level of such water. Within Section 4.15 of the Zoning Ordinance of St. Mary's County, titled "Requirements for 100-Year Flood Areas", the flood area is defined as "that continuous land area adjacent to a water course, whose elevation is equivalent to, or below, the flood base elevation. First flood elevation of building must be elevated two feet above the floodplain. Although the 100-year flood frequency is used to define the section, it is not incorporated within the definition of the floodplain within the Section.

Zoning regulations for Talbot County state that no dwelling for human occupancy shall be located "where the finished grade at any point adjoining the building and for a distance of at least five feet in all directions is less than five feet above mean sea level....and the lowest habitable floor is to be at least seven feet above mean sea level." Also, no such building is allowed in the 50-year floodplain. The Washington County Zoning Ordinance prohibits the construction of structures for human habitation or use within the 50-year floodplain in accordance with Soils Limitation Maps and appropriate local, state and federal reports, regulations and ordinances. Where questions arise as to whether an area is within the 50-year floodplain, the developer must have an engineering analysis performed before he is given a building permit. The tidal counties of Talbot, Queen Anne's and Worcester establish minimum elevation bases above mean low water sea level for residential construction, reflecting historical flooding level data.

The four jurisdictions classified as Class C impose few or no formal restraints on floodplain development through zoning. The Zoning Ordinance in Kent County, for example, merely provide that the zoning administrator determines if the land is "reasonably safe" from flooding, although the regulations recite directory criteria for construction relative to flotation, lateral movement, etc. The Carroll County Zoning Code provides generally that conditions for zoning approval may include floodplain management measures.

Although Wicomico County appears in Class D, the county plan provides for a conservation category of land use which includes swamp and marsh not in the pat of urban expansion. Worcester County has a Conservation District within their Zoning Ordinance with similar provisions. All counties on the lower Eastern Shore have an administrative policy of restricting hazardous uses in wetland and marsh areas. It should also be noted that, although floodplain regulation by zoning provides

an effective means of control and administration, the absence of zoning controls does not necessarily indicate an absence of floodplain management. Subdivision controls, for example, may effect similar results, as may the implementation of informal administrative policies such as forced dedication of open space.

B. Subdivision Regulations

Local subdivision regulations in Maryland vary considerably in their method of controlling development in flood-prone areas. Table 3 beginning on the next page, summarizes these regulations by placing them in three different categories. The first category includes those jurisdictions which restrict development within areas specifically defined such as lands subject to flooding at least once in a given time period (e.g. - the 50-year floodplain). The burden is placed on the subdivider to identify those areas in which hazardous development will be restricted. In most cases, the jurisdiction is in the process of identifying these restricted areas either through engineering studies completed by them, by a federal agency such as the U.S. Soil Conservation Service, or by the State Department of Natural Resources. Identification of the flood-prone areas is placed on the subdivision plat and provides notice to the building inspector in his review before issuing a building permit where the building codes so require.

Category two shows those jurisdictions whose subdivision regulations restrict or prohibit development in land "subject to periodic flooding." These areas are not specifically defined in terms of frequency of flooding. The burden of identifying these areas is generally shared by the subdivider and the jurisdiction. The primary burden appears to be on the jurisdiction with the interpretation of the regulation within the discretion of the reviewing authority. The subdivider is at a disadvantage since there is no published uniform criteria available to him to provide him notice of the standards (such as provided in category one) which the jurisdiction will use in approving or disapproving a request to subdivide other than the fact that subdividing lands subject to periodic flooding is restricted.

Category three identifies those jurisdictions which allow development of flood-prone land upon expressed conditions which are set forth in Table 3. Most of these conditions are permissive in that they <u>may be</u> required if the subdivider or jurisdiction makes a certain finding or agrees to certain covenants.

As indicated in Table 3, eight counties make reference to a specific frequency of flooding within which development is controlled. Five counties restrict development of land "subject to periodic flooding", while thirteen others allow plats to be issued for "flood-prone" areas provided adaptive measures are undertaken to render the land reasonably safe from flooding. Among jurisdictions using non-specific terminology to identify flood-prone areas for purposes of subdivision regulations, the general tendency is to employ a generalized review system subject

Table 3 - Summary of Subdivision Regulations Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Allegany County	Subdivision land within the 30-year floodplain will not be approved.		Land having adverse physical conditions or poorly drained soils may be platted if subdividers agree to make land substantially safe.
Anne Arundel County	Lots shall not be platted within the 100-year floodplain, in tidal marshes or wetland swamps.	Tidal flooding only- all lots below the hurricane tidal level of the Chesapeake Bay and tributaries shall have 1st floor elevation of all principal structure above hurricane tidal level.	
Baltimore City			Subdivider must prove that subdivision will not create flood or water conveyance problems for upstream or downstream property owners or general public.
Baltimore County			Planning Board requires that all lots shown on plats shall be adaptable for the intended purposes without danger from fire, flood, erosion.

(Continued)

Table 3 Con't
Summary of Subdivision Regulations
Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Baltimore County Con't			Policy is for developer to determine whether or not land is in 100-year floodplain. It is the Department of Public Works' decision whether changes are required by the developer to insure compatibility with the flood hazard.
Calvert County	Development in the 50-year floodplain restricted to those uses in floodway restricted under zoning ordinance.		Development in flood-prone land may be permitted. Flood-prone land may be part of the building lot if there is a 20' setback between structure and usable land.
Caroline County		Land subject to periodic flooding will not be approved.	Land with poor drainage or adverse physical conditions may be subdivided if the developer agrees to make the land safe for its intended use.

Table 3 Con't
Summary of Subdivision Regulations
Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Carroll County	The 100-year floodplain is required to be shown on the preliminary subdivision plan where it is used in conjunction with the building code to restrict construction within the floodplain.		
Cecil County			Land subject to frequent flooding may not be developed (covered under zoning regulations).
Charles County			
Dorchester County			Land subject to flooding or deemed topographically unsuitable shall be set aside for uses not endangered by flooding on the conditions that adequate safeguards have been installed to eliminate hazard.

Table 3 Con't
Summary of Subdivision Regulations
Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Frederick County		Restriction of subdivision of land within the 50-year floodplain is within discretion of County.	Land located in an area having poor drainage or adverse physical conditions may be approved if subdivider agrees to make such improvements as in the judgement of Planning Commission will make the land safe.
Garrett County			
Harford County		Subdivision of land subject to periodic flooding will not be approved.	A plat of a proposed subdivision having poor drainage or otherwise adverse physical conditions may be approved if the developer agrees to make the land "substantially safe."
Howard County	Floodplain defined as "that area which would be inundated by storm water run-off equivalent to that which would occur from rainfall (Continued)	Any substantial development within the floodplain is prohibited. Land may be acquired by the County as a stream valley park (Continued)	

Table 3 Con't
Summary of Subdivision Regulations
Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Howard County Con't	of a 100-year frequency assuming total development of the watershed as shown in the General Plan for the County."	or may be dedicated to a home owners association.	
Kent County		Land subject to periodic flooding will not be approved for residential occupancy.	Land subject to poor drainage or adverse physical conditions may be approved if subdivider agrees to render the land acceptable for development.
Montgomery County	Land may be platted but development is prohibited within the 50-year floodplain which must be delineated by developer.		Buildings prohibited on "unsafe land."
Prince George's County	The subdivision for development of any real property which lies within the 50-year floodplain of (Continued)		

Table 3 Con't
Summary of Subdivision Regulations
Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Prince George's County Con't	any streams or drainage course shall be restricted, controlled or prohibited.		
Queen Anne's County		Land subject to periodic flooding will not be approved.	Land subject to flooding at an elevation less than 5' above mean sea level may be subdivided if adverse conditions are corrected by filling or drainage, or other means.
St. Mary's County			
Somerset County			
Talbot County			Regulations direct the Planning Officer to refuse approval of subdivision where the land is unsuitable for development because of flooding, lack of drainage, erosive action, unstabilized slope or fill, or other conditions which may cause danger to life,

(Continued)

Table 3 Con't
Summary of Subdivision Regulations
Which Limit Floodplain Development

Jurisdiction	Category 1 Regulations expressly restrict development in the floodplain by flood frequency	Category 2 Regulations restrict or prohibit development in land "subject to periodic flooding"	Category 3 Regulations allow development of "flood-prone" land upon condition
Talbot County Con't			health, or property, or aggravate erosion or flood hazards, or cause the land to be unsuitable.
Washington County	Residential development prohibited within the 50-year floodplain under zoning.		
Wicomico County		Land subject to periodic flooding will not be approved.	Land topographically unsuitable will not be approved, but restriction will be set aside for such uses as do not produce unsatisfactory conditions.
Worcester County			

to broad administrative review. However, two counties, Anne Arundel and Calvert, establish specific standards -- e.g., yard alignment and setback lines -- for plat approval. In Howard County where flood-prone land is not acquired or dedicated, the floodplain may be included within the boundary of a lot, but the minimum area of the lot according to the Zoning Regulations may not include that area within the floodplain.

Table 4 beginning on the next page, summarizes the subdivision review procedures for all the counties and Baltimore City with regard to restricting the subdivision or development of land within flood-prone areas. The summary in Table 4 is divided into four columns. Column one identifies the jurisdiction; Column two shows which jurisdictions require, either through regulation or administrative policy, that areas subject to flooding be shown on the subdivision plat or plan. The third column shows the flood related standards for plat approval by determining the elevation in terms of flood frequency below which development is restricted. The fourth column defines the basis for the procedures. They are based either on subdivision regulations or administrative policy.

Table 4 shows that seventeen jurisdictions require that flood-prone areas be shown on the subdivision plat or plan. Five jurisdictions require this by formal regulations and the remaining twelve require it through administrative procedures. In each regulation, the requirement, expressly or implicitly, places the financial responsibility and burden of providing a floodplain designation on the developer, including the compilation of topographic and soils data and floodway cross-sections. In Prince George's County for example, the subdivision regulations restrict development in the floodplain and, in cases where flood study have not already provided precise floodplain delineations, places the responsibility of defining the boundaries of such floodplain on the developer. The planning board may review the required data with the technical assistance of local, state and federal agencies as appropriate.

The ordinances of seven jurisdictions do not require that lands subject to flooding be identified; of these, four counties have no subdivision regulations and two make no mention of flooding tendencies in plat review. Table 4 further indicates that in twelve jurisdictions, a specific frequency of flooding is required to be shown on the plat. Five jurisdictions only generally require the designation of "flood-prone" land. As indicated, most local subdivision regulations do not require the designation of flood-prone areas on design plans; rather, the more common practice is to enforce the requirement by unwritten policy under the planning commission's general authority. Allegany and Dorchester Counties expressly require that developers submit topographic data while Washington County expressly requires the designation of high water for any intersecting waterways.

Table 4 - Summary of Subdivision Review Procedures Restricting Development in Flood-Prone Areas

Jurisdiction	Are flood-prone areas required to be shown on subdivision plats?	Criteria used to designate flood-prone areas*	Basis for procedure
Allegany County Topographic maps required	Yes	30-year floodplain	Administrative policy
Anne Arundel County	Yes	100-year floodplain	Required by subdivision regulation
Baltimore City	Yes	Unclear	Administrative policy
Baltimore County	Yes	100-year floodplain	Administrative policy
Calvert County	Yes	50-year floodplain	Administrative policy
Caroline County	Yes	Periodic flooding	Administrative policy
Carroll County	Yes	100-year floodplain	Incorporated into subdivision regulation by preliminary requirements
Cecil County	Yes	Frequent flooding	Administrative policy
Charles County	No		
Dorchester County Topographic maps	Yes	Flood-prone land and wetlands	Administrative policy
Frederick County	Yes	50-year floodplain	Administrative policy
Garrett County No subdivision regulations	No		
Harford County	Yes	100-year floodplain	Administrative policy
Howard County	Yes	100-year floodplain	Required by subdivision regulation
Kent County	Yes	Periodic flooding	Administrative policy

*Method of computation based on generally applicable engineering principles. No jurisdiction has designed criteria for use in defining the floodplain.

Table 4 Con't
Summary of Subdivision Review Procedures
Restricting Development in Flood-Prone Areas

Jurisdiction	Are flood-prone areas required to be shown on subdivision plats?	Criteria used to designate flood-prone areas*	Basis for procedures
Montgomery County	Yes	50-year floodplain	Required by subdivision regulation
Prince George's County	Yes	50-year floodplain	Required by subdivision regulation
Queen Anne's County	No		
St. Mary's County Topographic maps required	No		
Somerset County No subdivision regulations	No		
Talbot County Topographic maps required	Yes	50-year floodplain	Zoning Regulations-<u>if</u> required by Planning Officer
Washington County	Yes	50-year floodplain	Zoning Regulations (for habitable buildings)
Wicomico County	Yes	Periodic flooding	Administrative policy
Worcester County	No		

*Method of computation is based on generally applicable engineering principles. No jurisdiction has designed criteria for use in defining the floodplain.

There is a tendency among counties to require dedication of flood-prone land to the county or reservation of flood-prone areas as open space. The owner of a subdivision may voluntarily dedicate flood-prone areas for open space uses. The county may grant waivers or decline dedication where excessive public works expenditures would be required for maintenance. The alternative requirement, called reservation, that flood-prone areas be preserved as open space avoids the maintenance problem by placing restrictions on privately held land. In other words, dedication results in public acquisition and upkeep of flood-prone areas while reservation places restrictions on uses within flood-prone areas by the private owner.

The planning commissions of Charles and Wicomico Counties have informally implemented policies favoring dedication of flood-prone land Frederick County provides for acquisition of flood-prone land for county parks. In these jurisdictions, however, there is no express mention within the subdivision regulations of floodway dedication. There are indications that such informal policies are effected in other jurisdictions, particularly where other floodplain regulations have been enacted.

Montgomery County is expressly empowered (through the Maryland-National Capital Park and Planning Commission) to acquire floodplain properties as available in the open market. A similar program is under consideration by the County Task Force on Flooding in Prince George's County. Anne Arundel, Baltimore and Howard Counties also have formal programs for the dedication or reservation of flood-prone land.

C. Building Codes

The use of building codes in regulating floodplain development is less prevalent than are zoning or subdivision controls. The building code is typically a police power measure, regulating construction materials and design specifications, which establishes standards for allowable stress, sanitary conditions, fire proofing, and, less frequently, flooding susceptibility. Usually, the code is some version of a building association model code, such as BOCA (Building Officials Conference of America) or SSBC (Southern States Building Code). Fourteen Maryland jurisdictions have enacted building codes, but the codes of only eight counties* incorporate standards for construction in floodways or address concerns particularly to flood-prone land. See Table 1 beginning on page 6 which references Building Codes which incorporate flood protection measures.

The Charles and Calvert Counties Building Codes use two general criteria to determine if Special Construction Standards are required. The two requirements are that (1) the construction is consistent with the need to minimize flood damage and (2) that construction is reasonably safe from flooding. If construction is within a flood hazard area, the building inspector can require that the building be properly anchored to prevent flotation and such other methods and practices that will minimize flood damage.

*Baltimore, Calvert, Carroll, Charles, Howard, Montgomery, Prince George's and Worcester Counties.

Under the Howard County Building Code, an individual can erect a building within the 100-year floodplain if the structure is elevated two feet above the 100-year flood elevation. The subdivision regulations don't allow buildings to be constructed within the 100-year floodplain. An inconsistency results in that non-subdivision buildings are allowed to be constructed within the floodplain while subdivision buildings are not. Carroll County has a similar building code regulation; however, as stated in Table 3 a delineation of the 100-year floodplain is required to be placed on the subdivision plat to guide the building inspector in restricting buildings in these areas unless they are elevated two feet above the 100-year flood elevation. The Baltimore County Building Code requires the elevation of the first or main floor to be at least ten feet above mean low tide and that basements below this grade be water-tight and withstand hydrostatic pressure. In flood-prone areas, the elevations of buildings "shall not be less than two feet above the flood level as determined by the Department of Public Works."

In Montgomery County, the Building Code prohibits building within five hundred feet of the banks of the Potomac River, Great Seneca Creek, Little Seneca Creek, Rock Creek and the Patuxent River. The only exception to this is when the 50-year floodplain boundaries have been defined, and they are closer than 500 feet to the banks of said streams. The Prince George's County Building Code provides that, where buildings are constructed in areas subject to tidal inundation, such structures must be supported by specified approved types of support, and the first floor elevation must be no lower than ten feet above mean low tide as established by the County Department of Public Works. Building space below that level must be enclosed and floored for water tightness and hydrostatic pressure. Separate provisions are made for residential structures within areas subject to flooding by surface waters or running streams; dwellings must have all floors built at least two feet above the 50-year flood levels with additional restrictions provided within floodplains with excessive storm flow capability. Moreover, windows, doors and other openings below minimum floor level must meet water tight standards for walls and floors, and a sump pump (with a 15 g.p.m. discharge capacity) must allow for the removal of water from lower areaways. The Howard County Building Code has similar provisions.

Worcester County, the only county located on the Atlantic Ocean, has special regulations for construction in areas subject to flooding and erosion from ocean water. These regulations are administered by the County Office of Building Inspection. All buildings and structures are required to have their first or main floor elevation not lower than 18 feet above mean low water at the berm dune line and 10 feet above mean low water at the east side of the berm dune line to the Coastal Highway. At the west-side of the Coastal Highway, the elevation shall be nine feet above mean low water. Also, all buildings or structures are required to be supported on pilings, reinforced concrete piers, or monolithic concrete foundations designed in accordance with "approved engineering standards."

CHAPTER 3

Anticipated and Ongoing Local Activities

A survey of local and regional planning proposals revealed that many jurisdictions are drafting new comprehensive plans which encompass floodplain management policies. Several local jurisdictions indicated a hesitation to enact restrictive measures in the absence of detailed accurate delineations of flood-prone areas. Some jurisdictions are in the process of drafting proposed ordinances while others are preparing background studies which will result in manuals addressing land use patterns and stormwater management techniques in major watersheds. Most of those drafting proposed ordinances are relying on the receipt of special flood hazard boundary maps prepared by the Flood Insurance Administration under the Department of Housing and Urban Development.

Allegany County is developing a floodplain management program similar to that partially implemented in Frederick County which involves the designation of two floodplain zones -- annual and historical. The annual floodplain zone or district would be defined by soil maps showing the location of the 50-year floodplain. These maps have been prepared by the Soil Conservation Service. The historical floodplain zone would be based on historical flood elevation data. Development would generally be prohibited within the historical floodplain.

The State Department of Natural Resources, in coordination with the Anne Arundel County Stormwater Resources Management Committee, composed of citizens from major watersheds and county engineers, is developing a design manual for use in the design and construction of stormwater conveyance systems. The design manual addresses techniques for on-site retention of stormwater as well as controlled release to lower peak downstream storm flows.

Baltimore City is seeking eligibility within the regular insurance program administered by the Department of Housing and Urban Development. This action will necessitate the adoption of more stringent floodplain management measures. The City's Planning Department is reviewing ordinances from other states and working to develop a less permissive building permit system and increase the level of coordination between Baltimore City and Baltimore County by proposing joint study programs for entire watersheds rather than for that particular part of the watershed within one or the other jurisdiction. Currently, Baltimore City and Baltimore County are participating in a joint stormwater management study of the Jones Falls. That Study is addressing different alternatives for protection of flood-prone areas. Conditions include: cost, guidelines for control of sedimentation and erosion, and a translation of these alternatives into concrete plans, guidelines and ordinances to be developed by both jurisdictions.

The Environmental Studies Section of Baltimore County Department of Planning and Zoning is preparing a natural resources inventory. This inventory will include topographic studies and investigation of runoff characteristics of various soil types including identification of alluvial soils. Data from this inventory was recently used to recommend that development within flood-prone areas be limited for a particular site in the northern section of the county. A Stream Valley Task Force, working in coordination with the County Departments of Public Works and Planning and Zoning, is recommending an acquisition program for properties located in areas subject to flooding. The Task Force suggested condemnation of flood-prone areas in the Gwynns Falls and Roland Run areas.

Baltimore County's zoning regulations are currently undergoing revision in response to recent development trends. A significant part of this revision deals with the redefinition of zoning classifications and corresponding zoning districts. These regulations would restrict the density of development within designated areas and, under the concept of deferred planning, seek to delay development in certain areas where service utilities are not readily available. A comprehensive floodplain zone classification is anticipated pending delineation of floodplain areas by future Federal flood insurance studies.

Baltimore County has also just recently implemented a Storm Water Management Program effective December 1, 1974. The program is oriented towards reducing stream channel erosion, siltation, and sediment pollution associated with land development actions. This concept of on-site storm water control is a technique which is capable of attaining certain degrees of flood control and represents a first step toward a more comprehensive watershed management program.

Carroll County is seeking to acquire detailed delineations of the 100-year floodplain for all major watersheds. This information will be used to enforce existing regulations with greater accuracy.

Cecil County planners have developed a new comprehensive plan which will require more stringent control of development in flood-prone areas. The County is seeking ways to map flood-prone areas with greater specificity with the intention of expanding the existing floodway zone.

Charles County developed a new comprehensive plan which recommends that portions of land bordering Zekiah Swamp Run and Mattawoman Creek and lands adjacent to Port Tobacco Creek and the Wicomico River be preserved as open space or set aside for parks and recreational areas.

Dorchester County's new comprehensive plan addresses to a limited extent the need for adopting more stringent control of flood-prone areas.

Garrett County is considering a zoning ordinance which would regulate development within the 50-year floodplain as delineated by the Corps of Engineers and the Maryland Department of Natural Resources. Building construction standards would be imposed on all development within the 50-

year floodplain. These standards would include a minimum elevation of three feet above the floodplain and a 50-foot setback requirement from the outer limits of the encroachment lines of any body of water and flood-proofing. The Zoning Ordinance is scheduled for a public hearing in early 1975.

The Planning and Zoning staff of Harford County has drafted a "proposed new ordinance for the development code of Harford County," portions of which are addressed to floodplain management. Under the proposed ordinance, the developer would be required to delineate the 100-year floodplain using USGS quad sheets or more reliable information. Land within the floodplain could be utilized for lawns, gardens or agricultural uses but no structures would be permitted. The developer would have the option of delineating at his own expense the floodway, flood fringe and the floodplain. If the developer chooses this option, he would be allowed to develop or construct within the flood fringe, provided adequate floodproofing measures are installed, and provided the fill is no lower than one foot below the 100-year flood level for the given area. The proposed ordinance further provides that if a building not constructed in accordance with ordinance standards is destroyed by flood waters, such building may not be reconstructed unless it meets the required construction standards. A developer who wishes to contest the permitted uses within the floodplain is allowed to appeal to the County Council.

As of November 1974, Howard County has drafted, but not yet adopted, a new zoning ordinance which would prohibit residential building within the floodplain. This proposed ordinance also refers to the floodplain fringe areas which would allow residential building if the lowest floor elevation is at least two feet above the elevation of the 100-year floodplain. If uncertainty exists as to the location of the floodplain boundary, the applicant must prepare engineering analysis and submit it to the Office of Planning and Zoning for review and approval.

As of January 1975, Montgomery County had no new regulatory measures effecting flood-prone areas, i.e. the County was not drafting new subdivision regulations, zoning ordinances or building codes effecting land use in flood-prone areas. However, several major flood control and stormwater management studies are underway and may be utilized to enact appropriate floodplain management regulations in the near future. The Anacostia River Basin Study being conducted in both Montgomery and Prince George's Counties is a detailed joint study by the Department of Natural Resources and the Maryland-National Capital Park and Planning Commission. The Study will develop a watershed response model which will compute the 50 and 100-year floodplains, and the effects of land use on the watershed and will examine the effects of on-site stormwater detention systems. One of the end products will be a planning manual addressing flood control and stormwater management.

Similar to the Anacostia River Basin Study are the Muddy Branch and Seneca Creek projects in Montgomery County. The Maryland-National

Capital Park and Planning Commission is studying these areas to determine how runoff should be accommodated and utilized to its best advantage. The findings from these projects will be used in the study of other watersheds and will form the basis for a comprehensive stormwater management planning program.

The Montgomery County Department of Environmental Protection is developing a hydrologic simulation model which will be a tool for the evaluation of results of land use decisions and for evaluation of alternative stormwater management systems, to be developed under public control in order to mitigate adverse effects of land use changes. The Watts Branch watershed is being studied as a pilot for the County, and the model may be calibrated for, and applied in, any watershed (or subwatershed) in the county. Efforts are being made to coordinate data base development with other operating agencies in order to economize on this expensive program.

Following Hurricane Agnes, the Prince George's County Council created a task force on flooding to prepare long and short range action programs for flood prevention. Recommendations of this Study include use of the 100-year floodplain as the regulating standard and encourages the maintenance of stream valleys in their natural state except for recreational purposes. The task force also favored the gradual acquisition of existing properties located in flood-prone areas. The task force also recommended that there be a reduction of the property tax assessment for residential properties subject to flooding.

Queen Anne's County, as of August 1974, was drafting a new comprehensive plan. The consulting firm responsibile for drafting this plan has identified the 100-year floodplain for all portions of the County. A draft of the plan recommends that no habitable dwellings be permitted within the 50-year floodplain and only limited development within the 100-year floodplain. Public hearings on the plan are expected in early 1975.

St. Mary's County is discussing the adoption of subdivision regulations which would restrict development in flood hazard areas. It is also expected that the County will adopt a building code which will regulate construction in flood-prone areas.

In 1974, Talbot County passed new comprehensive zoning, subdivision and sediment control ordinances regulating the development in flood-prone areas, minimum elevations for newly constructed buildings, and erosion and sedimentation.

Washington County has hired a consultant to define more accurately the 50-year floodplain for major watersheds. These completed delineations will replace those previously used which were based on soils information.

At the present time, Wicomico County is in the process of drafting a new comprehensive plan. With public hearings expected by the end of

1975, the proposed plan recommends that the County locate parks and recreational areas within the natural drainage basins and that these basins or stream valleys be maintained in their natural state.

Worcester County planners are undertaking background studies for a new master plan. It is anticipated that this plan will be presented for adoption sometime in 1975.

CHAPTER 4

A Brief Look At State Responsibilities

In the State of Maryland, no legislation exists requiring local jurisdictions to enact floodplain management programs. Legislation of this type has been introduced at the General Assembly but has yet to be passed. However, there are existing laws which affect the use of flood-prone areas. These laws are discussed below under each agency which has the responsibility for their enforcement. Also discussed are rules and regulations promulgated pursuant to these laws.

The Department of Natural Resources

The Natural Resources Article (Section 8-303) of the Annotated Code of Maryland requires the issuance of a permit by written application to the Department of Natural Resources before any person may "construct, reconstruct, or repair any reservoir, dam, or waterway obstruction." A permit is also required before additions, changes or repairs may be made upon such works. Broadly, wherever private activity changes in any manner "the course, current, a cross-section of any stream or body of water" within State waters, a permit must be required. State waters are defined to include the floodplain of free-flowing waters determined by the Department on the basis of the 50-year flood frequency.

However, the law states "a small pond, except a waste water stabilization pond, which has a contributory drainage area of less than one square mile (640 acres), a normal depth of water less than 15 feet above the original stream bed, and a normal surface area less than 12 acres is exempt from the requirement of obtaining a permit from the Department if: (1) the plans and specifications are approved by the appropriate soil conservation district; (2) the pond is not located within drainage of the Gwynns Falls, Jones Falls or Herring Run Streams situated in or adjacent to Baltimore City; and (3) the pond meets minimum standards for safety set forth in the Department rules and regulations." The soil conservation district is required to notify the Department of any pond approval.

This same Section states that "the Department may designate interjurisdictional watersheds in which any impoundment proposal is subject

to review and approval by the Department for standards relating to safety and flood control. Gwynns Falls, Jones Falls, and Herring Run, situated in or adjacent to Baltimore City are designated interjurisdictional watersheds.

Section 8-807, dealing with permit procedures, states the following:

> "Before acting on any permit application, the department shall weigh all respective public advantages and disadvantages and make all appropriate investigations. If the Department believes from the evidence before it and based upon State water resources policy declared in this subtitle that the applicant's plans provide greatest feasible utilization of the waters of the state, adequately preserve public safety, and promote the general public welfare, it shall grant the permit to....construct, reconstruct, or repair the proposed waterway obstruction,....if the Department believes, from the evidence before it, that the proposed....construction is inadequate, wasteful, dangerous, impracticable or detrimental to the best public interest, it may reject the application or suggest modifications to the proposed plans to protect the public welfare and safety.
>
> In granting any permit to appropriate or use water, or construct any reservoir, dam or waterway obstruction, the Department may include any condition, term, or reservation concerning the character, amount, means and manner of the appropriation or use or method of construction necessary to preserve proper control in the state and insure the safety and welfare of the people of the state." .

Section 8-901 of the Article deals with flood control. It states the following:

> "The Department is responsible for developing and carrying out a long range program for controlling flood waters in the state. In addition, the department shall cooperate with the federal and local governments to control state flood waters and serve in a liaison capacity to these governments in any flood control matter.
>
> The Department shall provide technical assistance to local governments and other state units to interpret flood information and draft local land use and other regulations pertaining to areas subject to flooding. It shall review plans for local public works and exercise regulatory control over them in or on waters of the state as provided in Subtitle 8 of this title. The department shall administer financial assistance for flood control as funds for this purpose are made available."

In 1964, the Maryland General Assembly enacted legislation reorganizing some state agencies for the planning, development and management of water resources. Subsequently, the Bureau of the Budget directed the newly formed Water Resources Department (now the Water Resources Administration under the Department of Natural Resources) to have a study made to clarify its role and to make recommendations to fulfill its responsibilities. In response, a Water Resource Study Committee was set up. The Study Committee's goal was to identify responsibilities of the Department which, by law, were explicit or implied. The Committee made reference to the following guiding principles: (1) water resources development cannot be fully developed without reliable interdepartmental relationships; (2) water resources management is not a single-disciplined science but requires an amalgamation of many disciplines; (3) agency staffing must be adequate and competent; and (4) competent administration of delegated responsibilities requires strict surveillance and enforcement of the agency program. Publications of the Committee are available from the College of Agriculture, University of Maryland, College Park, Maryland.

The Water Resources Study Committee, in a publication dated August 1967, recommended that the state delineate floodplains as a basis for floodplain zoning at either the local or state level. House Bill 895, popularly called the Floodplain Management Act of 1974, would have directed the Department of Natural Resources to delineate floodplains within the state to a detail sufficient to develop regulations and enforce encroachment restrictions. This 1974 proposal included: (1) delineation of all floodplains in the state flooded at least once every 100 years; (2) establishment of flooding encroachment lines; and (3) a permit system for the regulation of floodway uses. This Bill was not passed by the Assembly.

In addition to permit-granting activities, the present program of the Water Resources Administration includes the following: keeping track of the various studies conducted by other agencies which may provide raw data for further study; conducting floodplain studies usually requested by local jurisdictions and agencies for utilization in land use planning; transmitting and assigning priorities for Corps of Engineers floodplain information studies and soil conservation studies; conducting studies in cooperation with other State and local agencies, such as the Soil Conservation Service and the Maryland-National Capital Park and Planning Commission; acting as State Coordinator for the National Flood Insurance Program; and other duties already discussed concerning Section 8-901 of the Natural Resources Article of the Annotated Code of Maryland. A primary water resources goal of the Department of Natural Resources is to develop the capability to model the distribution and circulation of water in developing watersheds and thereby better manage natural and manmade activities.

The Department of Natural Resources is also in the process of publishing a Stormwater Design Manual. The manual discusses stormwater management objectives, principles and policies necessary to familiarize the reader with the fundamental, hydrological, engineering and legal

concepts of stormwater management. It discusses those design considerations and constraints which must be taken into account for specific design situations. It sets forth calculation criteria and procedures sufficient for complete system design, with work design examples and illustrations included. The last chapter discusses the integration of various design and planning techniques involved in developing a complete and coherent stormwater management scheme.

The Department of Health and Mental Hygiene

Three agency regulations govern development of land in flood-prone areas. Regulation 10.03.27, "Regulations Governing Individual Water and Sewerage Systems Where Public Water and Sewerage Systems Are Not Available", states that prior to issuance of a construction permit, "When, upon the review of the application, the Approving Authority (the Secretary of the Department of Health and Mental Hygiene or his designee) is convinced that the proposed design is inadequate, or soil and geological conditions are such as to preclude safe and proper operation of the desired installations, a permit to proceed with construction shall be denied." Therefore, installation of on-site private water and sewerage systems are not permitted on lands which have poor drainage, or where flooding frequently occurs. Regulation 10.03.28, "Regulations Governing Water Supply and Sewerage System In The Subdivision of Land", defines lot areas to mean "the total area which is included within the area, side and front lines, but to exclude those areas covered by mean high tide; in an existing or proposed public road; and excluding areas having land sloped exceeding twenty-five percent, and areas located within the fifty-year floodplain." Therefore, subdivision is not permitted on lands where the buildings would be susceptible to inundation from mean high tides, or to stormwater runoff produced from rainfall of fifty-year frequency. Regulation 10.03.30, "Regulations Governing Submission of Plans For Approval and Record of Systems of Water Supply, Sewerage, Storm Water and Refuse Disposal", requires plans for construction of storm drains to conform to the following:

> All calculations leading to the location of inlets and the sizes and slopes of storm drains must be submitted with the plans or previous thereto. This is to include the intensity of rainfall to be considered, its frequency of occurrence, the coefficients of runoff, the inlet time, the summation of calculated flows at various progressive distances along the drains, the spacing and types of inlets, the hydraulic calculations leading to the selection of pipe sizes, and slopes, and details of manholes, inlets, headwalls, and appurtenances.

The Department of Transportation

Approximately 20% of the roads in the State are state-owned including Interstate systems, with state owned rights-of-way encompassing a large land area. This Department's policies with regard to floodplain and stormwater management have a strong effect on storm flow of most Maryland waters. The Department has incorporated floodplain and stormwater management into their activities. However, the General Assembly has never given this Department the responsibility to promulgate regulations affecting non-state transportation systems as related to floodplain and stormwater management.

The policy of the Project Planning Division of the State Highway Administration is that transportation related construction not obstruct the 100-year floodplain. The State Highway Administration incorporates historical flooding data, watershed development characterizations, and gauging station data as well as detailed on-site evaluations including impact of planned construction into all bridge and highway design. All bridge and highway design plans are reviewed prior to construction by the Water Resources Administration under the Department of Natural Resources for their potential flooding effect.

The Department of State Planning

Article 88C of the Annotated Code of Maryland states that the Department of State Planning shall "prepare, and from time to time amend, revise, or change, a plan or plans for the development of the State, which plan or plans collectively shall be known as the State Development Plan." Included in the plan or plans are to be "recommendations for the most desirable general pattern of land use within the State." The Department is currently in the process of preparing a Generalized State Land Use Plan as an element of the State Development Plan.

The Maryland General Assembly Session of 1974 amended the Department of State Planning's enabling legislation to include requirements to (1) coordinate with federal, state and local government agencies, regional and interstate agencies, organizations, institutions and interested citizens during the preparation of the State Development Plan; (2) designate Areas of Critical State Concern; (3) establish statewide data referencing standards; (4) establish a depository of state and local comprehensive and functional plans; and (5) intervene in administrative or judicial proceedings involving land use decisions to represent the interests of the State in those proceedings.

The primary purpose of the State plan is to serve as an advisory guide for units of State government. State expenditures for State and local facilities, and State regulatory programs, have reached the point where there exists a need to have a comprehensive framework for making these important decisions. The critical areas duties require that local governments recommend areas of critical State concern to the Department of State Planning and that the Department designate areas of critical State

concern in the State plan after considering local recommendations. Although the legislation did not define the term "areas of critical State concern", it is not difficult to define them. Floodplains are a good example - land which has a special hazard potential of Statewide concern.

It is important to realize, however, that the critical area legislation did not result in any additional regulatory authority in the State government. It is suggested that for the most part the required action will come at the local level. In some instances, there may already exist appropriate local regulations. For example, if floodplains are designated, it may be that the county already has an effective floodplain ordinance. As discussed previously, however, additional regulations or local actions of some sort may be necessary.

The intervention procedure will involve a review as a matter of course of those documents and acts which serve as a foundation for land use proceedings of a local government -- the comprehensive plan, the text of the zoning ordinance, the text of the subdivision regulations, and the comprehensive mapping of zones; (these normally affect an entire county, or a substantial portion of a county, and because their scope has a broad impact), and participation in certain individual proceedings such as zoning map amendments, special exceptions and variances and the administration of subdivision regulations. With respect to these individual proceedings, the Department will participate only when it appears that the Department's views would be of assistance in reaching an appropriate decision. In other words, the majority of these individual proceedings will involve matters of strictly local concern, and the Department will participate only when there is a substantial State interest present. Also, local subdivisions are required to notify the Department of State Planning "of applications for zoning, permits, or authority to use, develop, or construct upon land which involves more than local impact and is of substantial State and regional interest."

CHAPTER 5

Judicial Reaction to Floodplain Regulations

This chapter is intended to provide local planners and administrators with an understanding of fundamental legal concepts and problems frequently encountered when drafting and implementing floodplain regulations. The following summary, from the Planning Advisory Service of the American Society of Planning Officials Report No. 277, Regulation for Floodplains, discusses what are valid regulatory objectives:

> To meet constitutional due-process requirements, regulations must be adopted to serve valid police-power objectives. Floodplain regulations are designed primarily to require individual

responsibility in land use. Generally, the power of the legislature is broad in determining what is or is not a valid police power objective. Based upon an examination of floodplain and non-floodplain cases which have considered the validity of regulatory objectives, it may be observed that:

(a) Courts have usually been quite willing to sanction regulations which prevent or control uses with nuisance-like effects such as encroachment in floodway areas which may damage neighboring properties by increasing flood heights and velocities. Courts give much weight to such objectives in balancing public and private rights.

Judicial support may be found for regulations to protect public health and safety by regulating uses in flood-prone areas where private on-site water supply or waste disposal is unsatisfactory or where flood waters may disrupt public water supply or waste disposal.

(b) Judicial support can also be found in both flood-plain and other land-use control cases for regulations which serve broad objectives in promoting the social, economic, and political well-being of a community.

Some flood-plain regulations have come under attack as only protecting the individual against his own folly. While it is not clear that flood-hazard regulations could be enacted to protect the flood-plain occupant only from the consequences of his own acts, judicial precedent exists in other contexts for regulations which protect the health, safety, and economic well-being of the individual and thereby the public health, safety, and general welfare. Rarely do existing flood-plain regulations appear to be aimed at only preventing losses of the occupant. Regulations which require that individual structures be elevated above flood heights reduce economic losses to the individual, protect the safety of occupants, prevent the structures from floating onto other lands or channels, prevent blighting and unsanitary conditions - which often result from flooding - and minimize social disruption which occurs when structures cannot be used during or soon after flooding. In drafting regulations, care should be exercised in considering the public impact of any purposed restriction and the need to balance public needs and private desires for freedom and privacy.

Regulations which prohibit all economic uses in a flood-hazard area with low-damage potential to protect an individual against flood losses may be illogically and unconstitutionally preventing all economic land uses in order to reduce minor losses. However, most flood-hazard regulations prohibiting obstructions in floodway areas,

prohibiting dwellings in high-hazard coastal areas, or requiring minimum protection in other areas are more broadly based.

(c) Courts have also been favorable to regulations for the prevention of fraud. Regulations to prevent fraud might include subdivision regulations for hazard areas, requirements that flooding threats be noted on recorded instruments, requirements that sellers or real estate brokers disclose the presence of flood-hazard provisions applying to lands, or other techniques.

(d) Courts have not generally sustained regulations which allocate lands to their most appropriate uses from the viewpoint of the community as a whole if the lands are not then adaptable to some private economic uses. Approaches which guide development in a manner consistent with the flood hazard rather than attempting to prohibit development may help overcome these objections. Allocation of low-hazard (non-floodway) lands to open-space uses or public uses such as wildlife areas, parks, recreation areas, flood-storage areas, or parking lots may require exercise of eminent domain powers rather than regulatory powers. Generally, courts have disapproved attempts to provide flood storage through the use of regulations.

A sound regulatory program for guiding private and public land uses in flood-prone areas must take into account both the most desirable uses of land from the viewpoint of the community as a whole and the needs and rights of private landowners. The private landowner is by no means a forgotten man in the courts and cannot be disregarded in formulating management and regulatory policies. To withstand constitutional challenges, regulations must generally allow private economic uses for lands while, simultaneously, guiding uses to serve general welfare objectives.*

Given the above concepts, the following focuses on statutory and case law in Maryland.

The responsibility for the public health, safety, and welfare - including the power to protect private property and lives from flood hazards - lies in the sovereign power of the State which is represented above as the "police power". While the exercise of this power resides originally in the Legislature, it is within the State's power to delegate authority for various purposes to local governmental subdivisions or to State administrative agencies. Article 25, Section 11A of the Annotated Code of Maryland, allows the county commissioners of all counties to "acquire by purchase...condemnation, or otherwise, any property, or any interest therein, of any kind needed for any public

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purposes;" similar provisions are made in the Code for counties adopting charter or other special forms of county government. Similarly, the General Assembly delegates to State agencies various powers to protect both citizens and their property and public interests and property. For example, Section 8-807 of the Natural Resources Article of the Annotated Code of Maryland empowers the Department of Natural Resources to grant permits and establish conditions for the use of State waters and for the construction or modification of reservoirs, dams and similar obstructions. Generally, any statute adopted under the State police powers is presumed valid wherever there exists a substantial relationship between its object which is enforcement and the means or regulation employed to obtain it, provided that persons are not deprived of property without just compensation.[1]

Arguments that floodplain regulations take private property without payment of just compensation are common because these regulations often prohibit certain uses such as buildings within the floodway. The Maryland Court of Appeals, in a case concerning the legality of a statute prohibiting holders of strip-mining permits from continuing their operations, recently restated standards for finding an unconstitutional taking by the State of private lands for the public benefit.[2] If the owner affirmatively demonstrates that the legislative or administrative determination deprives him of all beneficial use of the property, the action will be held unconstitutional. But the restriction imposed must be such that the property cannot be used for any reasonable purpose. It is not enough for the property owners to show that the zoning action results in substantial loss or hardship...[3] The decisions of the Maryland Court of Appeals appear to establish an extremely strong standard in support of the power of government to regulate under the police power. It is difficult to imagine a more rigorous standard.

Whether a particular State act amounts to permissible police power regulation or a "taking" for which compensation must be paid is determined by the court on the basis of the facts before it. There are no Maryland cases which discuss whether a regulation allowed an unconstitutional taking of private flood-prone land. As an example however, a 1959 Connecticut case upheld the validity of a State statute allowing the Connecticut Water Resources Commission to prohibit encroachment on privately owned land beyond an established delineation of the floodplain without a permit from that authority.[4]

The Connecticut Supreme Court upheld the delineation against a landowner whose buildings had been destroyed in a 1955 flood, where the encroachment line had allowed "only 60 square feet of the property

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1 Salisbury Beauty School v. State Board of Cosmetologists, 268 Md. 32, 300 A.2d 367 (1973).

2 Bureau of Mines v. George's Creek, 272 Md. 143, 321 A.2d 748 (1974).

3 Baltimore City v. Berinsky, 239 Md. 611, 212 A.2d 508 (1965).

4 Vartelas v. Water Resources Commission, 146 Conn. 650, 153 A.2d 822 (1959).

for the erection of any structure apart from one approved by the Commission." The court ruled that the regulation was valid and not an unconstitutional taking of property since it sought to prevent repetition of flood destruction which occurred in the 1955 flood period. The court upheld the delineation as established in accordance with "sound engineering principles and statutory requirements" and since they were "designed to reduce hazard to life and property."

A question often raised by State and local officials concerns the minimum permissible accuracy of flood data. Naturally, regulations which are designed to guide development consistent with the flood hazard must be based upon sufficiently exact flood data to define the area of inundation and the severity of the flooding threat. Otherwise, the regulations or means of enforcement would not reasonably tend to fulfill the objective of the regulations - to minimize the flood damage.

One recent case upheld the requirement of a permit from the Department of Natural Resources before filling within the 50-year floodplain boundaries.[5] The court noted that the Department of Natural Resources had power to regulate the floodplain under a series of legislative grants under the Natural Resources Article of the Maryland Annotated Code.[6] The statute, the court held, intended to extend DNR jurisdiction over the floodplain on the basis of a 50-year flooding frequency determined by conditions in existence at the time of its determination. The statute did not intend, therefore, to require that the floodplain be delineated on the basis of some future development.

However, the Court of Appeals stated that it was proper for the trial court to accept the testimony of the expert witness of the landowner that the computations used by DNR should have been adjusted to reflect the substantial changes in the floodplain caused by Hurricane Agnes. In other words, the floodplain delineation must be reasonably related to the basis for their existence which is identified within the statute using them as an enforcement measure. DNR's failure to change the floodplain delineation when it had knowledge that a substantial change in the character of the floodplain occurred as a result of Hurricane Agnes was unreasonable even though the statute said that the floodplain should be determined by conditions in existence at the time of the determination of the floodplain.

Therefore, the court disagreed with DNR's contention that administrative problems resulting from recalculation of the floodplain after every major storm would be insurmountable. The court recognized that the information provided by Smith's engineer was pertinent in proving the

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[5] Smith Sand and Gravel Company v. Department of Natural Resources, 270 Md. 653, 313 A.2d 820 (1974).

[6] These can be found in Sections 8-101, 8-301, 8-901, 8-904, 8-1103, 8-1107, 8-1108, 8-1401, 8-1405, 8-1409, 8-1412 to 8-1417. See page 31 for discussion of some of these sections.

difference of approximately 2 feet in the flood level determination proposed by DNR. This case appears to be consistent with the Connecticut case discussed previously. However, the court expressly rejected the contention that the regulation constituted a taking of private property without just compensation.

It is clear that flood hazard calculations designed to require adjustment of floodplain areas to the flood threat must be based upon supportable data. Although there has been no ruling by a Maryland Court, it would appear that "interim" regulations providing for temporary measures otherwise proper, should be sufficient if based upon flood hazard data defining general limits of a flood hazard area and provided (1) a reasonable effort is made to adjust these limits upon notice of a possible change in alignment due to natural causes such as a hurricane, and (2) that delineations be corrected as more specific data is generated. This data can be accumulated on a case-by-case basis when development is proposed or at such reasonable time as detailed engineering studies are completed.

CHAPTER 6

Summary of Findings

This summary is limited primarily to the discussion of local programs regulating flood-prone areas. Reference to local regulations is set forth in Table 1 and then are further discussed and evaluated within Chapter 2. Jurisdictions have been classified into three categories which represent their ability to control harmful development or uses within flood-prone areas through either zoning, subdivision or building code regulations or any combination of these regulations. Class 1 jurisdictions are those which have enacted regulations restricting development within clearly defined flood-prone areas. An example of a clearly defined flood-prone area is that area identified as being within the 50-year floodplain.

Jurisdictions which have enacted regulations or established procedures which restrict harmful development within flood-prone areas not geographically or legislatively delineated are within Class 2. An example of a Class 2 jurisdiction is a jurisdiction which provides by regulation that (1) land subject to flooding will not be approved within a subdivision or (2) building is not allowed unless elevated two feet above the flood level as determined by the jurisdiction. Class 3 jurisdictions are those which may provide some administrative review for the identification of flood hazard areas. These jurisdictions have failed to enact regulations or develop administrative guidelines to provide either local administrators or the public, including developers with notice that flood-prone areas may be subject to certain restrictions. The table below lists the counties of the State and the City of Baltimore, their classifications as defined above and the standard used for

Table 5 - Summary of Jurisdictions With Regard to Their Ability to Control Uses Within Flood-Prone Areas

Jurisdiction	Classification	Review Standard
Allegany County	1	30-year floodplain
Anne Arundel County	1	100-year floodplain
Baltimore City	3	Not clear
Baltimore County	2	100-year floodplain
Calvert County	1	50-year floodplain
Caroline County	2	Land subject to periodic flooding
Carroll County	1	100-year floodplain
Cecil County*	2	Land subject to frequent flooding
Charles County	2	Construction must be consistent with the need to minimize flood damage.
Dorchester County	3	Flood-prone land and wetlands.
Frederick County	1	50-year floodplain
Garrett County	3	None
Harford County	2	100-year floodplain
Howard County	1	100-year floodplain
Kent County	2	Land subject to periodic flooding.
Montgomery County	1	50-year floodplain
Prince George's County	1	50-year floodplain
Queen Anne's County	2	Land subject to periodic flooding.
St. Mary's County	2	100-year floodplain
Somerset County	3	None
Talbot County	2	50-year floodplain
Washington County	1	50-year floodplain
Wicomico County	2	Land subject to periodic flooding.
Worcester County	2	Areas subject to flooding and erosion from ocean water.

*Cecil County is placed in a Class 2 category because the floodplain district is applicable to only a small portion of the County's flood-prone areas.

regulatory or administrative review such as the "30-year floodplain" or "land subject to periodic flooding." If local regulations or administrative guidelines have inconsistent standards for reviews, the most stringent is listed. Also, this report did not look at the enforcement of regulatory or administrative programs and therefore cannot comment with regard to the application and effectiveness of individual programs.

Regulatory programs within Class 1 are based on uniform standards applied equally to all development in flood-prone areas within a jurisdiction and provide for adequate prior notice to the public of areas which may be subject to regulation. Also, Class 1 jurisdictions are in conformity with the requirements of the regular federal flood insurance program, which requires that flood-prone areas be identified and properly regulated. One problem that is consistent throughout Class 1 is that there are no enacted requirements for updating delineations to reflect changing land uses and other changing characteristics brought about by natural occurrences.

Class 2 jurisdictions have permissive programs in that the administration of regulations and local procedures are based upon the discretion of the person or department supervising the program rather than based upon enacted legislation as in Class 1. However, where effectively administered, these programs may be as adequate if not more so than Class 1 in dealing with changing watershed characteristics where findings are based on an evaluation of contemporary watershed characteristics, e.g. - case-by-case review. The key to Class 2 programs is uniform and adequate administration. Meaningful delineation representing contemporary watershed characteristics is essential for Class 1 and Class 2. If properly enforced and updated, regulatory programs of both Classes can provide for adequate control of hazardous development in flood-prone areas.

In discussing uniformity of the application of regulatory programs within a jurisdiction and the need to update delineations to properly reflect changing watershed characteristics, it is necessary to point out that the geometry of watersheds disregards jurisdictional boundaries. Likewise, an examination of local flood control programs, with the exception of two jurisdictions, revealed no active interjurisdictional floodplain management programs. However, all jurisdictions agreed that interjurisdictional cooperation is vital for a successful intrajurisdictional floodplain management program due to the necessity that upstream and downstream watershed uses be responsive to one another.

Although zoning, subdivision or building code regulations by themselves can serve as an effective means of intrajurisdictional control if properly enforced, it is important that they not conflict with each other. Most local regulations were consistent within a given jurisdiction. One area of conflict was where subdivision regulations permitted the division of land in areas where zoning regulations or building codes restricted such development, or vice versa.

It is suggested that each regulation (zoning, subdivision and building regulations) incorporate consistent control provisions so that (1) applicants for building permits, subdividers of land or any member of the public who must utilize a local regulatory procedure and obtain county or city approval, will be notified that certain restrictions will be placed against them if the activity which is involved takes place within a flood-prone area and is hazardous with regard to the specific use and/or neighboring uses; (2) the regulatory scheme is properly coordinated, managed and enforced; and (3) the ability of a jurisdiction to control potential flood hazards is strengthened with regard to the above and will avoid the possibility of litigation which may attack the jurisdiction's regulation of flood-prone areas due to inconsistency or the appearance of inconsistency.

As discussed previously, meaningful delineation is essential. In Chapter 5, the judicial response to floodplain regulations was that they be reasonably related to their purpose of notifying the public of the locations of regulated flood hazard areas and that reasonable effort should be made to adjust delineations of floodplain upon notice of changes in alignment due to man-made causes such as increases in development upstream or natural causes such as hurricanes and severe storms. Reasonable effort means that counties should update the floodplain or regulatory limit as knowledge of substantial changes in the floodplain character becomes available either through their own surveys or upon proof that such a change in alignment has actually taken place.

It is also suggested that floodplain boundaries corresponding to the 100-year flood or other standard under ultimate land use conditions be incorporated into the County Master Plan and shown on zoning or other appropriate maps for informational purposes.

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